HIV Positive Expectant Mothers and Their Infants: HIV Testing, AZT and Pediatric Treatment Cost Savings

Introduction. This article discusses trends in HIV testing of pregnant women and AZT treatment of those who are HIV positive. Treating pregnant women with AZT according to accepted protocols reduces vertical transmission of the virus from mother to child by approximately two thirds. Because of this, it is possible to estimate the savings in the cost of treating perinatal HIV infections that have been avoided. Perinatal cases are those in which the virus is transmitted from the mother to the child during pregnancy or delivery or through breast feeding. Estimates of treatment cost savings based on different assumptions are also presented.

The testing and treatment data used were compiled from pediatric case reports in the HIV/AIDS reporting system.

HIV Testing. Tests to detect HIV did not become available until the mid 1980s. This explains why pregnant women were not tested before giving birth in the years 1982—1984. For births to HIV-positive women in 1988 whose cases were reported to STD/AIDS surveillance, 45% (4/9) of the women had been tested either before or during pregnancy. The percentage of mothers whose HIV-positive status was known at the time of delivery rose to 52% (16/31) in 1989. The percentage reached 93% in 1992 (73/77) but then declined to 83% (52/63) in 1993 and 86% (54/63)in 1994.

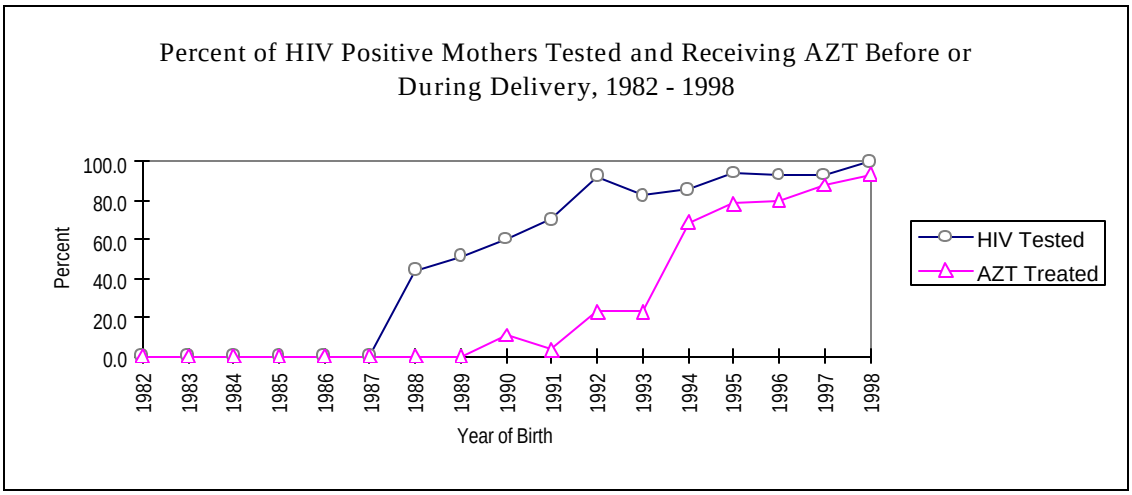

Figure 1

The Public Health Service issued HIV counseling and testing guidelines for pregnant women in 1995 and the Virginia legislature passed a law, effective in July, 1995, requiring that physicians offer counseling and voluntary testing to their pregnant

patients.[1] The percent of HIV-positive mothers whose status was known during pregnancy rose to between 93% and 94% in 1995 - 1997. Including all cases reported through September 30 of this year, the 1998 rate is 100% (16/16).

Table 1: Baseline Numbers

Annual births	92,000
Lifetime treatment costs	$ 491,936
Transmission rate without AZT	0.26

AZT Treatment. AZT (zidovudine) has been used to treat patients with HIV since 1987. The percent of HIV-positive women receiving AZT who also gave birth rose gradually from 0% (0/2) in 1987 to 23% (6/26) in 1993.

The Public Health Service recommended in 1994 that AZT be used to treat HIV-infected pregnant women after the AIDS Clinical Trial Group 076 (ACTG 076) results showed that AZT treatment reduced mother-to-infant transmission by two thirds, from about 26% to about 8%.[2, 3, 4] The percent of reported cases of Virginia mothers receiving AZT before or during pregnancy and delivery tripled from 23% (6/26) in 1993 to 69% (31/45) in 1994.

The percent of women receiving AZT treatment has continued to climb each year since 1994. It was 79% (33/42) in 1995 and rose to 88% (45/51) in 1997. Through the first three quarters of 1998, all but one mother (94%, 15/16) had received AZT.

Pediatric AIDS Treatment Costs.

It is possible to estimate treatment cost savings over the lifetime of a pediatric AIDS patient. The data in Table 1 are used to calculate savings estimates and includes the number of births per year in Virginia, the cost of treating a perinatal AIDS case and estimates of HIV transmission rates with and without AZT treatment of the mother during pregnancy.[5]

Table 2 presents estimates of the amount of money saved when the prevalence of HIV is varied in the population of pregnant women. The highest rate in Table 2 is 0.0015 (1.5 HIV infections/1,000 women); this figure matches the highest HIV prevalence rate recorded by the Survey in Childbearing Women, a study of HIV prevalence among women giving birth. The STD/AIDS Division conducted this survey 1989 and 1995. If the rate of infection is 0.0015, then approximately 138 HIV infections are expected among the population of women giving birth (92,000 x 0.0015).

Estimating the number of pediatric infections resulting from mother-to-child transmission requires multiplying the number of infected mothers by the transmission rate. If AZT is not

Table 2: Estimated Treatment Cost Savings by HIV Seroprevalence Rate

Seroprevalence Rate	Infected Mothers	Infections Without AZT	Infections With AZT	Infections Avoided	Treatment Cos Savings
0.0015	138	36	11	25	$12,298,40
0.0014	129	34	10	24	$11,806,46
0.0013	120	31	10	21	$10,330,65
0.0012	110	29	9	20	$9,838,72
0.0011	101	26	8	18	$8,854,84
0.0010	92	24	7	17	$8,362,91
0.0009	83	22	7	15	$7,379,04
0.0008	74	19	6	13	$6,395,16
0.0007	64	17	5	12	$5,903,23
0.0006	55	14	4	10	$4,919,36
0.0005	46	12	4	8	$3,935,48

administered to these mothers during pregnancy, the estimated number of perinatal infections is 36 (138 mothers x 0.26 transmission rate). If AZT is administered, the estimated number of infections drops to 11 (138 x 0.08). The difference between 36 and 11 is 25; this is the estimated number of perinatal infections avoided by treating HIV-positive women with AZT. The number of infections avoided is multiplied by lifetime treatment costs to estimate the amount of money saved in treating pediatric AIDS cases. At a prevalence rate of 0.0015, approximately $12,300,000 is saved (25 cases avoided x $492,000 lifetime treatment cost/case).

Conclusion. Pediatric HIV/AIDS case reports in which the mode of exposure to HIV is perinatal transmission show that an increasing proportion of mothers is tested before or during pregnancy. In recent years, this proportion has been above 90% and through September 30, 1998, it was 100%. In addition, among pediatric HIV/AIDS cases reported to the Virginia Department of Health, the proportion of mothers receiving AZT before and during their pregnancies has risen from 70% in 1994, when the result that AZT treatment reduced perinatal HIV transmission was announced, to 94% in 1998. These facts taken together indicate that the number of pediatric HIV infections due to perinatal transmission should fall and that treatment cost savings should follow.[6]

[1] U. S. Public Health Service Recommendations for Human Immunodeficiency Virus Counseling and Voluntary Testing for Pregnant Women, *Morbidity and Mortality Weekly Report* (07/07/95, vol. 44, no. RR-7).

[2] Recommendations of the U. S. Public Health Service Task Force on the Uses of Zidovudine to Reduce Perinatal Transmission of Human Immunodeficiency Virus, *Morbidity and Mortality Weekly Report*, 08/05/94, vol. 44, no RR-11.

[3] Conner, EM, RS Sperling, et.al. Reduction of Maternal—Infant Transmission of Human Immunodeficiency Virus Type 1 With Zidovudine Treatment. *New England Journal of Medicine* 331(18):1173-1180; November 3, 1994.

[4] The 1994 USPHS recommendations have been updated with: Public Health Service Task Force Recommendations for the Use of Antiretroviral Drugs in Pregnant Women Infected with HIV-1 for Maternal Health and for Reducing Perinatal HIV-1 Transmission in the United States, *Morbidity and Mortality Weekly Report*, 01/30/98, vol. 47, no. RR-2.

[5] The pediatric AIDS treatment cost estimate is from: Havens PL, Cuene BE, Holtgrave DR. 1997. Lifetime Cost of Care for Children With Human Immunodeficiency Virus Infection. *Pediatric Infect Disease J* 16(6):607-610, June.

[6] Compiled and written by J. Martin